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Applicant: **Shuo-Yen Robert Li**

Case: **8**

Serial No. **09/882,133**

Filed: **June 15, 2001**

Group Art Unit:

Examiner:

Title of Invention: **A CONDITIONALLY NONBLOCKING SWITCH OF THE DECOMPRESSOR TYPE**

THE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231

09882133.091401

SIR:

PRELIMINARY AMENDMENT

Enclosed is a Preliminary Amendment in the above-identified application. Please amend the application as follows.

In the Specification:

Replace pages 8 and 9 with the following:

-- SUMMARY OF THE INVENTION

The shortcomings of the prior art, as well as other limitations and deficiencies, are obviated in accordance with the present invention by applying algebraic principles to the physical realization of a large switching fabric based upon contemporary technologies.

In accordance with a broad method aspect of the present invention, a method for implementing a class of N×N decompressors each serving a connection

request to route m incoming signals, m≤N, and for enabling the service of any connection request in a nonblocking way on the condition that the connection request is compliant to certain constraints, the method for each of the decompressors includes: (a) configuring a switch defined by a set of connection states and having an array of N input ports with N distinct input addresses and an array of N output ports with N distinct output addresses wherein the m incoming signals arrive at m distinct input ports determining m active input addresses and are destined for corresponding m distinct output ports determining m active output addresses, and wherein said constraints on the connection request are that: (1) the m active input addresses are consecutive upon a rotation of the ordering of the N input addresses, and (2) the correspondence between the m active input addresses and the m active output addresses is order preserving after the rotation; and (b) routing the incoming signals from the m distinct input ports to the corresponding m distinct output ports by activating one of the connection states such that the activated one of the connection states accommodates the connection request subject to said constraints on the connection request, said class excluding (i) those having a switch constructed from the banyan network of switching cells prepended with the shuffle exchange and (ii) those having a switch constructed from the shuffle-exchange network of switching cells prepended with the shuffle exchange.

In accordance with a broad system aspect of the present invention, a class of N×N decompressors each serving a connection request to route m incoming signals, m≤N, and for enabling the service of any connection request in a nonblocking way on the condition that the connection request is compliant to certain constraints, each of the

decompressors includes: (a) a switch defined by a set of connection states and having an array of N input ports with N distinct input addresses and an array of N output ports with N distinct output addresses wherein the m incoming signals arrive at m distinct input ports determining m active input addresses and are destined for corresponding m distinct output ports determining m active output addresses, and wherein said constraints on the connection request are that: (1) the m active input addresses are consecutive upon a rotation of the ordering of the N input addresses, and (2) the correspondence between the m active input addresses and the m active output addresses is order preserving after the rotation; and (b) control circuitry, coupled to the switch, for routing the incoming signals from the m distinct input ports to the corresponding m distinct output ports by activating one of the connection states such that the activated one of the connection states accommodates the connection request subject to said constraints on the connection request, said class excluding (i) those having a switch constructed from the banyan network of switching cells prepended with the shuffle exchange and (ii) those having a switch constructed from the shuffle-exchange network of switching cells prepended with the shuffle exchange.

Please replace lines 1-3 on page 13 as follows: --

FIG. 21B depicts a (1 2 3) permutation on an 8×8 exchange;

FIG. 21C depicts a (3 1) permutation on an 8×8 exchange;

FIG. 21D depicts a combined (1 4)(2 3) permutation on an 8×8 exchange;--.

In the Claims:

Please cancel claims 1-21.

Please add claims 22-42 as follows:

--22. A method for implementing a class of N×N decompressors each serving a connection request to route m incoming signals, m≤N, and for enabling the service of any connection request in a nonblocking way on the condition that the connection request is compliant to certain constraints, the method for each of the decompressors comprising

configuring a switch defined by a set of connection states and having an array of N input ports with N distinct input addresses and an array of N output ports with N distinct output addresses wherein the m incoming signals arrive at m distinct input ports determining m active input addresses and are destined for corresponding m distinct output ports determining m active output addresses, and wherein said constraints on the connection request are that: (1) the m active input addresses are consecutive upon a rotation of the ordering of the N input addresses, and (2) the correspondence between the m active input addresses and the m active output addresses is order preserving after the rotation, and

routing the incoming signals from the m distinct input ports to the corresponding m distinct output ports by activating one of the connection states such that the activated one of the connection states accommodates the connection request subject to said constraints on the connection request,

said class excluding (i) those having a switch constructed from the banyan network of switching cells prepended with the shuffle exchange and (ii) those having a switch constructed from the shuffle-exchange network of switching cells prepended with

the shuffle exchange.

23. The method as recited in claim 22 wherein the configuring includes constructing the switch as an N×N k-stage switching network composed of k stages of nodes, an interstage exchange between any succeeding two of the k stages, an input exchange and an output exchange, and wherein each node is filled with another switch.

24. The method as recited in claim 22 wherein the configuring includes constructing the switch as an N×N k-stage switching network composed of k stages of nodes, an interstage exchange between any succeeding two of the k stages, an input exchange and an output exchange, and wherein each node is filled with a decompressor.

25. The method as recited in claim 22 wherein the configuring includes constructing the switch as a two-stage interconnection network composed of a first stage of nodes being the input nodes and a second stage of nodes being the output nodes, an interstage exchange, and an input exchange corresponding to the interstage exchange prepended to the network, and wherein each node is filled with a decompressor.

26. The method as recited in claim 22 wherein the configuring includes constructing the switch as an X2 interconnection network having nodes and wherein each node is filled with a decompressor.

27. The method as recited in claim 22 wherein the configuring includes constructing

the switch as an X2 interconnection network having nodes and wherein the nodes are filled with a plurality of decompressors.

28. The method as recited in claim 22 wherein the configuring includes constructing the switch as a recursive X2 interconnection network having nodes and wherein each node is filled with a decompressor.

29. The method as recited in claim 22 wherein the configuring includes constructing the switch as a recursive X2 interconnection network having nodes and wherein the nodes are filled with a plurality of decompressors.

30. The method as recited in claim 22 wherein the configuring includes constructing the switch as a recursive X2 interconnection network having nodes and wherein each of the nodes is a cell and each cell is filled with a 2×2 decompressor.

31. The method as recited in claim 30 wherein the 2×2 decompressor is a switching cell.

32. The method as recited in claim 22 wherein the configuring includes constructing the switch as a recursive X2 interconnection network of cells with each cell filled with a 2×2 decompressor.

33. The method as recited in claim 32 wherein the 2×2 decompressor is a switching

cell.

34. The method as recited in claim 22 wherein the configuring includes constructing the switch as a banyan-type network whose trace and guide are both monotonically increasing and wherein each of the 2×2 nodes of the banyan-type network is filled with a 2×2 decompressor.

35. The method as recited in claims from 34 wherein the 2×2 decompressor is a switching cell.

36. The method as recited in claim 22 wherein the configuring includes constructing the switch as a recursive plain 2-stage interconnection network of cells prepended with a swap exchange and wherein each cell of the network is filled with a 2×2 decompressor.

37. The method as recited in claim 36 wherein the 2×2 decompressor is a switching cell.

38. The method as recited in claim 22 wherein the configuring includes constructing the switch as a divide-and-conquer network of cells prepended with a swap exchange and wherein each cell of the network is filled with a 2×2 decompressor

39. A class of N×N decompressors each serving a connection request to route m

incoming signals, $m \leq N$, and for enabling the service of any connection request in a nonblocking way on the condition that the connection request is compliant to certain constraints, each of the decompressors comprising

a switch defined by a set of connection states and having an array of N input ports with N distinct input addresses and an array of N output ports with N distinct output addresses wherein the m incoming signals arrive at m distinct input ports determining m active input addresses and are destined for corresponding m distinct output ports determining m active output addresses, and wherein said constraints on the connection request are that: (1) the m active input addresses are consecutive upon a rotation of the ordering of the N input addresses, and (2) the correspondence between the m active input addresses and the m active output addresses is order preserving after the rotation, and

control circuitry, coupled to the switch, for routing the incoming signals from the m distinct input ports to the corresponding m distinct output ports by activating one of the connection states such that the activated one of the connection states accommodates the connection request subject to said constraints on the connection request,

said class excluding (i) those having a switch constructed from the banyan network of switching cells prepended with the shuffle exchange and (ii) those having a switch constructed from the shuffle-exchange network of switching cells prepended with the shuffle exchange.

40. The decompressor as recited in claim 39 wherein the switch is constructed by an

$N \times N$ k-stage switching network composed of k stages of nodes, an interstage exchange between any succeeding two of the k stages, an input exchange and an output exchange, and wherein each node is filled with another switch.

41. The decompressor as recited in claim 39 wherein the switch is constructed by an $N \times N$ k-stage switching network composed of k stages of nodes, an interstage exchange between any succeeding two of the k stages, an input exchange and an output exchange, and wherein each node is filled with another decompressor.

42. The decompressor as recited in claim 39 wherein the switch is constructed from a two-stage interconnection network composed of a first stage of nodes being the input nodes and a second stage of nodes being the output nodes, an interstage exchange, and an input exchange corresponding to the interstage exchange prepended to the network, and wherein each node is filled with another decompressor.--.

REMARKS

All of the original claims 1-21 have been cancelled, and replaced with claims 22-42 to ensure that the Applicant sets forth with particularity what the Applicant regards as his invention.

Accordingly, substantially all of the Summary of Invention (pages 8 and 9) has been replaced to be commensurate with the newly-added claims.

Typographical errors on page 13 relating to Figure numbers have been amended to secure correspondence between the Figures and the specification.

Respectfully submitted,

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Date: 9-8-01

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Page 13, line 1 has been amended as follows: --FIG. ~~22B~~ 21B depicts a (1 2 3) permutation on an 8×8 exchange;--

Page 13, line 2 has been amended as follows: --FIG. ~~22C~~ 21C depicts a (3 1) permutation on an 8×8 exchange;--

Page 13, line 3 has been amended as follows: --FIG. ~~22D~~ 21D depicts a combined (1 4)(2 3) permutation on an 8×8 exchange;--